AD-A190 849 THE ARTILLERY BATTLE: CAPITALIZING ON AVAILABLE TECHNOLOGY(U) ARMY COMMAND AND GENERAL STAFF COLL FORT LEAVENWORTH KS SCHOOL OF ADVANCED MIL ITARY STUDIES 1/1

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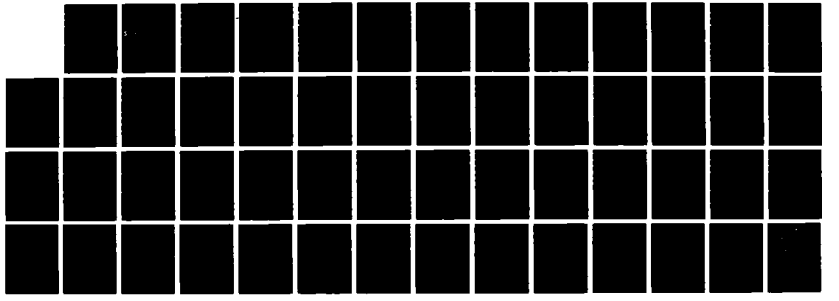

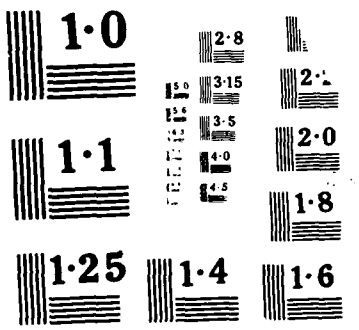
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AD-A190 849

The Artillery Battle: Capitalizing on Available Technology

by

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Field Artillery

School of Advanced Military Studies
U.S. Army Command and General Staff College
Fort Leavenworth, Kansas

4 December 1987

88-2172

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188
Exp Date Jun 30, 1986

1a REPORT SECURITY CLASSIFICATION
Unclassified

1b RESTRICTIVE MARKINGS

2a SECURITY CLASSIFICATION AUTHORITY

2b DECLASSIFICATION / DOWNGRADING SCHEDULE

3 DISTRIBUTION / AVAILABILITY OF REPORT
Approved for public release; distribution unlimited.

4 PERFORMING ORGANIZATION REPORT NUMBER(S)

5 MONITORING ORGANIZATION REPORT NUMBER(S)

6a NAME OF PERFORMING ORGANIZATION
School of Advanced Military Studies USAC & GSC

6b OFFICE SYMBOL (If applicable)
ATZL-SAV

7a NAME OF MONITORING ORGANIZATION

6c ADDRESS (City, State, and ZIP Code)
Fort Leavenworth, Kansas 66027-6900

7b ADDRESS (City, State, and ZIP Code)

8a NAME OF FUNDING / SPONSORING ORGANIZATION

8b OFFICE SYMBOL (If applicable)

9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER

8c ADDRESS (City, State, and ZIP Code)

10 SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO.	PROJECT NO	TASK NO	WORK UNIT ACCESSION NO

11 TITLE (Include Security Classification)
The Artillery Battle: Capitalizing on Available Technology

12 PERSONAL AUTHOR(S)
Major Gregory W. Allison, USA

13a TYPE OF REPORT	13b TIME COVERED	14 DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
Monograph	FROM _____ TO _____	87/12/~~31~~ 4	46

16 SUPPLEMENTARY NOTATION

17 COSATI CODES		
FIELD	GROUP	SUB-GROUP

18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
Artillery Battle, Russian Artillery, Counterfire
U.S. Artillery, Soviet Artillery, Counterbattery

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

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20 DISTRIBUTION / AVAILABILITY OF ABSTRACT
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS

21 ABSTRACT SECURITY CLASSIFICATION
Unclassified

22a NAME OF RESPONSIBLE INDIVIDUAL	22b TELEPHONE (Include Area Code)	22c OFFICE SYMBOL
Major Gregory W. Allison	(913) 684-2963	ATZL-SAV

DD FORM 1473, 84 MAR

83 APR edition may be used until exhausted
All other editions are obsolete

SECURITY CLASSIFICATION OF THIS PAGE
Unclassified

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The Artillery Battle: Capitalizing on Available Technology

by

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Field Artillery

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4 December 1987

School of Advanced Military Studies
Monograph Approval

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Accepted this 14th day of December 1987.

ABSTRACT

THE ARTILLERY BATTLE: CAPITALIZING ON AVAILABLE TECHNOLOGY, by Major Gregory W. Ellison, USA, 46 pages.

Currently NATO forces in Central Europe face a potential adversary who possesses a marked numerical superiority in artillery firepower. This fact is due in part to a political and military decision which tips our doctrine in favor of maneuver and technology. This monograph discusses the U.S. field artillery's approach to our doctrine and attempts to answer the question: Has the artillery to date succeeded in incorporating the potential, while avoiding the vulnerabilities, of recent technological developments that might defeat the Soviet artillery in the close battle?

The monograph first surveys the history of Russian and Soviet artillery, specifically its reliance on massive amounts of firepower as an integral part of overall Soviet doctrine. Next, it examines the salient features of current Soviet doctrine and the U.S.'s approach to Soviet mass. Lastly, the monograph examines the field artillery's current technological thrust to determine whether new technology was grafted to the old doctrine or whether doctrine was modified to take advantage of technology.

Finally, the monograph explores the doctrinal implications of employing recent technology. It concludes that doctrine is basically sound; however, steps should be taken to enhance the potential of the advances in light of Soviet attempts to counter them.

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SECTION I

INTRODUCTION

> New technology, when it has not been tried in combat, is seldom by itself a catalyst of doctrinal innovation.(1)
>
> A new technology will normally be assimilated to an old doctrine rather than stimulate change to a new one.(2)

Today in central Europe NATO forces face a potential adversary whose military doctrine espouses the high tempo offensive as the only means to success in war. In order to achieve that success the Soviet Union and her Warsaw Pact allies emphasize mass, a philosophy that has its roots in Russian geography and history. Specifically, it has been the geography of European Russia, the location of the majority of Russian and Soviet wars, that has had the greatest impact upon present day Soviet military doctrine.(3) The vast expanse of European Russian territory, as well as the historically large masses of forces that have fought there, have made it imperative that the Soviet Union develop a force structure that can rapidly move large masses of men over great distances

to meet an enemy threat. The necessity is even greater when one considers the expanse of Asian Russia and the enemy masses that face the Soviets there. Currently, the Soviets and their Warsaw Pact allies have structured their forces which face NATO into an organization which consists of 197 divisional equivalents (4), an impressive array of forces.

In order to control this massive organization, the Soviets have centralized their command and control apparatus. The rationale behind this doctrinal approach is driven by the operational requirements of their offensive doctrine. A Soviet operational commander's first concern is speed, which he achieves by echeloning his armies and divisions. Elegant tactical solutions appear to have little value to him (5), though at the tactical level mass is achieved in part through a series of battle drills which are used to rapidly move elements from a march formation into prebattle and attack formations.(6)

It is the emphasis on artillery at the tactical level that most glaringly highlights the philosophy of mass. Soviet artillery comprises from 15 to 25 per cent of the Soviet Army's manpower, but it is responsible for providing 80 per cent of the army's firepower.(7) In accordance with Soviet doctrine,

massive amounts of artillery are allocated to those maneuver forces which are making the Soviet main effort on the designated breakthrough zone. The nature of this type of artillery support enables the Soviets to mass as many as 300 tube equivalents per kilometer.(8)

Conversely, the United States has elected not to rely on mass. Instead, American political and military leaders have made the decision to tip towards technology over mass. This decision has had a significant impact on the U.S. field artillery in light of the fact that Warsaw Pact forces possess a marked numerical superiority in artillery firepower. The U.S. field artillery has attempted to offset the relative numerical disadvantage by developing enhanced delivery systems, better munitions, and a sophisticated target acquisition system. This may be the proper approach. However, history is replete with examples of nations developing new technologies in order to enhance their warfighting capabilities with unfortunate results. Too often efforts have been in vain because of the failure of those nations to field an adequate doctrine which incorporated the full potential of the advance. Two such examples occurred during World War I. In April of 1915, the Germans conducted the first major gas attack of the war in an

attempt to break the stalemate of the trenches at the Ypres salient. Suprise was achieved; the French were routed, but the Germans failed to capitalize on their new technology. A lack of significant reserves to exploit the breach created by the gas attack had not been provided for by doctrine.(9) The second example involves the use of the tank. Introduced to the front by the British in September of 1916, the tanks were employed in indequate numbers to achieve a penetration, the reason for which they were designed. It was not until the end of 1917 at Cambrai that the British employed their tanks in mass formation. Great initial success was achieved across the front, but the British were unable to capitalize on it because they failed to hold a reserve.(10) Once again, a nation had developed a new technology but failed to field an adequate doctrine to take advantage of its potential.

The question at hand is whether the U.S. field artillery will be able to avoid some of the many pitfalls of developing technology and doctrine in tandem. Specifically, has the U.S. field artillery to date succeeded in incorporating the potential while avoiding the vulnerabilities of recent technological developments that might defeat the Soviet artillery in the close battle?

Admittedly, this is a tough question to answer given the rush of technological developments in the modern age, and the dynamics of the U.S. political and military scene. I will examine the question by first exploring briefly the history of the Soviet artillery in Russian and Soviet military history. It behooves us to understand our potential enemy's long term trends if we are to have a sound development of the counters to those trends. Secondly, I will review the salient features of current Soviet doctrine and the approach the U.S. military has taken in the face of Soviet emphasis on mass. Next, I will examine the field artillery's current technological thrust and its development of employment doctrine to go with it. Lastly, I will review the doctrinal implications of all this.

SECTION II

History of Russian and Soviet Artillery

The Russians have long placed emphasis on using massive amounts of artillery to defend the Motherland. In the summer of 1382 they used their artillery to defend Moscow against the forces of Tartar Khan Tokhtamysh.(11) This was the first recorded use of artillery in the defense of Russia, and its effects on the enemy were devastating. The attacking Tartars lost over 24,000 men. The artillery, whose survival the Russian state depended on, and would continue to depend upon in the future, played a dominant role in the killing.(12)

The importance of artillery to the Russian state is also underscored by the attention its rulers have paid it throughout the centuries. Ivan IV, The Terrible (ruled 1533 to 1586), enjoyed watching firepower demonstrations to see "what his gunners could do."(13) His pastime translated into increased emphasis being placed upon the artillery arm. The results were soon evident since the artillery played a decisive role in the Russian capture of the Tartar city of Kazan in 1552. Additionally, Peter the Great,

building upon the experiences of his European contemporaries, used massive amounts of artillery most successfully in his war with the Swedes. On 27 June 1709, his artillery succeeded in breaking the Swedish attack at Poltava. Firing from ranges of 600 meters, the Russian artillery decimated the Swedish first line, and as the Swedes drew closer, the fires were shifted to the second line.(14) Up to that moment the Swedish army had been considered the premier force on the continent; Russian artillery ended that reign once and for all.

The late 1700's brought significant improvements in artillery technology, and Russian artillerists were quick to adjust. New canister rounds and the ability to fire cannons indirectly resulted in significant changes in the manner in which the Russians employed their artillery. Major-General Aleksandr Glebov, commander of the Russian artillery in the field from January 1760, was at the van with his doctrinal innovations. He is credited with creating an artillery reserve which was capable of intervening in a crisis or exploiting an opportunity. Furthermore, Glebov issued orders which spelled out the relationship between infantry and artillery commanders. The chief of artillery reported directly

to the Commander in Chief, and by the same token other artillery commanders reported directly to their maneuver commander and the chief of artillery simultaneously.(15) Remarkably, little has changed in the manner in which the Soviet artillery commanders of today still report.

From the late eighteenth century up to the beginning of WW I, the Russian artillery developed along parallel lines with artillery of the other European nations. Russian doctrine continued to emphasize the massing of artillery. This was clearly illustrated by Aleksandr Suvorov's handling of artillery during the storming of the Turkish fortress of Ismail on the Danube in December 1779. Suvorov concentrated 67 of his 110 guns on a narrow breakthrough sector in order to defeat the Turks.(16)

World War I brought considerable change in the manner in which the artillery supported the infantry. German use of artillery served as a catalyst for Russian doctrinal changes. The Russian fire support plan for the Brusilov Offensive was strikingly similar to that of the German Gorlitse-Tarnuv offensive of the previous year (1915).(17) The German plan did not negate the emphasis on mass; however, it did call for increased cooperation between the infantry and the

artillery. Developed by the German Bruchmuller, the plan called for the concentration of fires on carefully selected and reconnoitred targets and the thorough briefing of artillery and infantry officers together.(18) The Brusilov breakthrough was an unqualified success in part due to the excellent cooperation of the infantry and artillery, which is still a hallmark of current Soviet doctrine.

After World War I the Soviets began to think about using artillery as they do today: adapting it to a war of maneuver, using it to clear the way for their tanks and infantry, conducting long range counterbattery fire, and isolating the flanks of a penetration.(19) One of the most influential men of this new era was Vladimir Triandafillov. His treatise, The Nature of the Operations of Modern Armies, was based on an in depth study of World War I, and it revealed that modern armies lacked sufficient quantities of artillery to penetrate enemy defensive positions in future war. Triandafillov's findings were based upon wartime experience in which the density of fire was considered sufficient if fire weapons in a given zone could produce five rounds per minute per meter of front.(20) He concluded that the norms for a corps attacking on a 5 kilometer front required a minimum of

60 artillery pieces per kilometer, which was double the existing amount of artillery in the extant Soviet force structure. The outgrowth of Triandafillov's influence was a massive buildup of Soviet artillery which was supported in large part by Josef Stalin.

The Soviets entered World War II, their Great Patriotic War, with an artillery doctrine based upon mass. The Soviet Field Service Regulation of 1936 stressed that artillery was the greatest source of firepower, and that it was incumbent upon the artillery to pave the way for the tanks.(21) Unlike the Germans whose doctrine decentralized the use of artillery, the Russian doctrine called for a dual system of artillery control. Every level of command had its own organic artillery; however, massing was achieved by allocating centrally controlled artillery to those armies and divisions conducting the breakthrough attacks. To facilitate the control of allocated artillery, maneuver commanders formed groups at every level from regiment through army. The job of supporting the attack fell most heavily upon the regimental (RAG) and divisional (DAG) artillery groups while the counterbattery role fell to the army artillery group (AAG).

The fall of Stalingrad marked the turning point in World War II as the Russians went over to the offensive. The fighting of the previous years had led to a massive centralization of Soviet artillery. In 1941 only 8 per cent of the Red Army's artillery was in the High Command Reserve and by, August 1945, it was 35 per cent.(22) The Soviets organized their artillery into divisions and breakthrough corps. The mission of these centralized artillery units was to blow a hole through the German lines while simultaneously suppressing his artillery. Soviet artillery was assisted in this mission by specialized reconnaissance and target acquisition battalions which were able to plot approximately 70 per cent of the targets before the offensive began.(23)

The employment of Russian artillery in the Kiev Offensive should serve to highlight the Soviet emphasis on mass in the attack. On 3 November, 1943, the 38th Army was assigned the mission of penetrating a fully prepared and deeply echeloned defense in the Liutezh area. The army plan called for two rifle corps to make a penetration on a 6 kilometer front Centralized artillery from the other two armies of the Front (24) were allocated to the 38th Army. Of the 4200 guns, rockets, and mortars assigned to the Front,

2700 pieces, which did not include the artillery of the 2nd echelon, were concentrated on the penetration zone of 6 kilometers.(25) The net result was that the Soviets had massed 450 guns, rockets, and mortars per kilometer in the breakthrough zone. It must be noted that these densities were achieved by stripping artillery from the 'quiet sectors' which left between 10-12 pieces per kilometer in those sectors.(26)

Since the end of the World War II, the Soviets have not employed the amounts of artillery that were typical of the Kiev operation. This does not mean, however, that the Soviets no longer give great credence to their experiences of the Great Patriotic War. A quote from the forward of a Soviet Defense Ministries' book about artillery battles in the war should do much to explain how they view past military history and how it impacts upon their current doctrine:

> The experience of the combat use of artillery in battles and operations and its creative use are an important practical foundation on which are based conclusions and recommendations of modern theory of the use of artillery in battle and operations. To consider the lessons of the past in the interests of the present, in the interests of the development of military art--such is the task of today.(27)

SECTION III

SOVIET DOCTRINE

Current Soviet doctrine, like that of the Great Patriotic War, articulates the requirement for ground forces to concentrate their combat power to penetrate the defenses of a well prepared enemy. The Soviets achieve the requisite combat power by narrowing the zone of the army making the breakthrough attack. In some instances the army zone would be no wider than 65 kilometers with the breakthrough zone itself being no wider than 10 kilometers. Additional combat power is achieved by allocating artillery from higher levels of command in order to support the attack with preparatory, close, and counterbattery fires. Normally, 75 per cent of the front artillery division is allocated to the Army making the breakthrough attack.(28) Based upon today's force structure, the Soviets can expect to achieve a most favorable artillery ratio of 6-8 to 1 for all types of artillery in the breakthrough zone.(29) Quite literally, the artillery has the mission to pave the way for attacking units, destroying targets and objectives which hinder the movement of those forces.(30) Thus,

the Soviets appear to rely heavily upon artillery firepower in order to achieve combat power.

Soviet firepower is analogous to a combination of U.S. firepower concepts: "fire and maneuver" and "fire and movement." "Fire and maneuver" refers to the cooperation between the base of fire and the attack force. Under this concept the base of fire is established by a unit's fire support systems engaging the enemy while the attack force maneuvers. The attack force continues its advance until the base of fire is incapable of providing effective fire.(31) At that time the attack force splits and employs "fire and movement." Under this concept one portion of the attack force suppresses the enemy with its organic fires while the other closes and destroys him.(32) On the other hand Soviet doctrine gives the artillery the mission of providing both types of fire mentioned above. This becomes clear when one looks at the responsibility assigned to the artillery and the manner in which the Soviets employ their armor. Under Soviet doctrine the artillery is charged with the mission of neutralizing the enemy's antitank weapons.(33) Massive artillery fire is expected to suppress and neutralize enemy defensive positions until Soviet maneuver forces have closed within several hundred meters. Soviet research has produced

statistics which indicate that a rifleman takes approximately "...45 seconds, an ATGW crew 75 seconds, and antitank and tank crews 2-3 minutes to recover from a short artillery bombardment."(34) Thus, Soviet maneuver forces will have time to close with and destroy the enemy with their volley fire rapidly.

In order to maintain the massive artillery support, which is critical to a successful attack, the Soviets will attempt to achieve fire superiority over the enemy. This concept is analogous to the U.S. concept of air superiority; however, it refers to achieving a firepower advantage over the enemy through the use of artillery systems in the course of a given battle. Furthermore, it is characterized as a unit's ability to execute its own fire missions while suppressing those of the enemy.(35) Therefore, Soviet artillery will fight an artillery battle in order to support simultaneously the maneuver forces with close fires.

The organization of Soviet artillery supports the concept of fire superiority. Artillery commanders at all levels organize their allocated and organic artillery into groups of at least two battalions. Regimental artillery groups (RAG), normally located between one to three kilometers from the forward edge

of the battle area (FEBA), engage targets which hinder the advance of the attacking forces. The mission of division general support is assigned to the division artillery group (DAG) which doctrinally occupies positions from three to six kilometers behind the FEBA. It normally concentrates its fires in the zone of the regiment making the greatest success. The counterbattery mission, to which Soviet doctrine ascribes paramount importance, is performed by the army artillery group (AAG) with assistance from the DAG.(36) Located between five to eight kilometers behind the FEBA, the AAG's fires enables the ground forces to achieve fire superiority.(37)

During offensive operations, Soviet fire planners will phase their fires in order to maintain fire superiority over the enemy. Breakthrough operations consist of four phases with the preparation and support of the attack phases being key. NATO ground forces could expect a preparation to last as long as 50 and as little as 15 minutes prior to being assaulted by Soviet tanks and BMP's.(38) Given the artillery allocated to the breakthrough, the Soviets could be expected to support the preparation with over 3000 tube equivalents.(39) The preparation is intended to suppress and or destroy the enemy's ground forces with organized, centrally planned, massed fires

so as to severely degrade their ability to return fire. Preparation fires are directed against enemy strong points, command and control centers, communication systems, and, in particular, enemy artillery. Following directly upon the heels of, and designed to mesh completely with, the preparation is the "support of the attack" phase. Fires in this phase are planned to strike immediately in front of and on the flanks of attacking Soviet troops, shifting fires in sequential bands progressively deeper into the enemy's defensive positions.(40) In this phase the Soviets will use either a rolling barrage or successive fire concentrations. The type of fire employed is dependent upon the nature of the enemy defense. In the Great Patriotic War a rolling barrage was utilized against the German linear defense while fire concentrations were used against strong points in depth.(41) It is worth noting that these fires are planned and controlled by the artillery commander, located far forward in a command observation post, in conjunction with the maneuver commander. During normal operations, the fires are lifted and shifted using radio communications; however, if communications are jammed, pyrotechnic signals will be used to control the artillery.

To gain a clearer picture of Soviet artillery operations, we must examine two additional facets: artillery reconnaissance and firing norms. Artillery reconnaissance is further divided into its component parts of radar reconnaissance, both active and passive, and ground forces reconnaissance. When our weapons' locating radars transmit too long, Soviet radar reconnaissance can easily locate our powerful, highly directional emitters. Additionally, "Big Fred," a battle surveillance radar (20K range), as well as sound ranging systems (20K range), can rapidly locate firing enemy artillery. Artillery ground reconnaissance elements have the mission to ferret out both enemy artillery and maneuver locations prior to and during the battle.(42) These units provide a significant portion of the targets that fire planners target in the preparation and attack phases.

Lastly, we will look at firing norms, a concept which appears to be in a state of transition. Current doctrine establishes firing norms for ammunition expenditures, area coverage, effect of the target, and density of fire over time. An example of a 122mm SP howitzer battery firing on an enemy artillery battery should illustrate the point. To suppress the target, the firing unit would have to expend 450 rounds.(43)

Given that a 122mm howitzer's sustained rate of fire is 70 rounds per hour, it would take a battery approximately one hour to complete the mission. This is an incredible amount of time given the capabilities of U.S. weapons' locating radars. Chris Donnelly, in his article, "The Wind of Change in Soviet Artillery," clearly points out that the Soviets understand this vulnerability. By exploiting open source Soviet literature, such as Voennyy Vestnik (Military Herald), Donnelly has detected a change in the firing norm concept. He points out that Soviet Lieutenant General Stragnov, in his article, "The Basic Sub-unit of Artillery," believes that the firing norms are in need of revision.(44) General Stragnov's thesis was that the density and duration of shelling, not the volume, were paramount in this age of mobile armored targets. As an offshoot of studying the norm dilemma, the Soviets began to focus on the survivability issue. Donnelly illustrates this point by paraphrasing Marshall Peredelskiy, Commander of Rocket Troops and Artillery. Marshall Peredelskiy articulated the view that NATO artillery reconnaissance (radar) has the capability to locate Soviet artillery batteries within four minutes and bring down counterbattery fire very quickly.(45) Therefore, it was his opinion that Soviet artillery units would have to displace

frequently and fire as a battalion if Soviet artillery was to accomplish its mission.

SECTION IV

US APPROACH TO SOVIET MASS

The U.S. in conjunction with her NATO allies has elected to pursue a policy of flexible response to counter the Soviet emphasis on mass. It is the hope of Western nations that the Soviet Union and her Warsaw Pact allies will be deterred from war by a small but credible conventional force backed up by a large, flexible nuclear force. Ironically, the U.S. and the Soviets are about to sign an Intermediate Nuclear Force (INF) agreement which reduces the credibility of the nuclear deterrent and increases the burden of the conventional defense. The U.S. Army understands this dilemma. Today, a U.S. Army corps is expected to defend approximately 60 kilometers of NATO territory. If war broke out this force would most likely be matched initially against a Warsaw Pact Army.(46) To this end, in 1982 the Army took steps to offset the imbalance by implementing a new doctrine.

"AirLand Battle doctrine describes the Army's approach to generating and applying combat

power...."(47) Although the doctrine tips toward maneuver, firepower is relied upon to provide a significant portion of the combat power necessary to defeat the enemy. One portion of the firepower equation is fulfilled by fire support systems in general, and field artillery in particular.

Field artillery units support the force commander's scheme of maneuver by destroying, neutralizing, or suppressing the enemy by cannon, rocket, and missile fire.(48) To accomplish this mission, our doctrine assigns the artillery three roles: close support for the maneuver forces, counterfires, and interdiction. Tactical missions are assigned to individual and parent artillery units which facilitate the execution of those roles. A mission of direct support is assigned to an artillery unit which is providing close support fires to a maneuver unit. The interdiction and counterfire roles are normally executed by assigning artillery units either general support, general support reinforcing, or reinforcing missions. Typically, force artillery commanders tailor their assets to accomplish all three roles simultaneously. This becomes clearer when examining artillery organizational doctrine.

Currently, field artillery battalions and batteries are assigned to divisions and corps. Heavy divisional artillery (DIVARTY), which is found in Europe, consists of three 155mm SP howitzer battalions, a multiple launch rocket system (MLRS) battery, a target acquisition battery (TAB), and a command and control headquarters. In accordance with doctrine, each 155mm battalion will be assigned a mission of direct support to a maneuver brigade.(49) The TAB has the mission of locating targets, particularly enemy artillery, which assists the MLRS battery in performing the roles of counterfire and interdiction. Artillery units assigned to the corps fall under corps artillery. Those battalions are organized in field artillery brigades which are normally assigned a tactical mission exclusive of direct support. Corps artillery commanders, with corps commander's approval, tailor their brigades to fit the mission of the corps. It is interesting to note that both U.S. corps in Europe have only one MLRS battalion each and no target acquisition batteries.

In the face of a numerical superior Soviet threat, the field artillery has turned to process and technology, a step which has been made necessary since the fire support system does not have enough resources to attack every target acquired.(50) Currently,

divisional and corps artillery utilize target value analysis (TVA) and the tactical fire direction system (TACFIRE) to manage fire support assets. TVA is a methodology which allows planners to determine which targets out of the massive Soviet array should be attacked to give the maneuver commander the greatest tactical benefit for the resources expended. Furthermore, TVA links the effects of attacking a target to the function of that target.(51) Planners and intelligence personnel have developed TVA's for 17 different European tactical situations.(52) It is the job of the fire support planners to maximize the results of the TVA process by integrating the product with TACFIRE. The TACFIRE system was designed with the end goal of increasing the efficiency of the fire support system to engage threat targets. It accomplishes this by providing a completely integrated system of fire control complexes that use digital computers, remote devices, graphical display units and control consoles.(53) Additiona' , it significantly enhances the ability of the fie l artillery to plan, coordinate, and execute fires i support of the commander's battle plans. For t e most part, TACFIRE has accomplished this goal but the issue of timeliness, which will be addressed latter, in this author's opinion remains in doubt.

Having examined the salient features of U.S. artillery doctrine, it is instructional to compare it with Soviet artillery in a breakthrough zone to gain a clearer picture of artillery mass differential. As previously mentioned, the Soviet division making the breakthrough attack would be supported by 75 per cent of the Front's artillery and all of the Army's artillery. The zone of attack would probably be no wider than 10 kilometers which is approximately the size of a maneuver brigade's defensive sector. We will assume that the corps and division commanders are all knowing. To this end, we will liberally position the following fire support assets to support the one maneuver brigade which is receiving the brunt of the attack: two field artillery brigades (includes one MLRS Bn), the divisional MLRS battery, the direct support 155mm battalion, and the brigade's mortars. The sum total of this impressive artillery array is 636 tube equivalents.(54) This pales in comparison to the 3000 plus tube equivalents the Soviet army could muster to support its attack. From this comparison it is understandable why the artillery considers counterfire to be one of its primary roles.

SECTION V

Current Technological Thrust and Doctrinal Development

The U.S. Army's field artillery branch has been in the van with respect to developing new technologies to counter Soviet mass. Two recent acquisitions, the multiple launch rocket system and the Firefinder radar, possess great potential for making a significant impact upon the counterfire battle.

Firefinder radars give the target acquisition battery a tremendous increase in capability compared to its predecessor, the AN/MPQ-4A radar. The Firefinder's AN/TPQ-36 and 37 radars were designed to detect and locate enemy mortars, artillery, and rockets quickly and accurately enough for immediate engagement by friendly counterfire.(55) Primarily projected as a mortar locating radar, the Q-36 has the additional capability of locating low-angle enemy artillery fire out to ranges of 24 kilometers. The Q-37 complements the Q-36 by locating low-angle hostile artillery out to ranges of 50 kilometers.(56) Additionally, both radars can simultaneously track up to 10 hostile projectiles and store 99 locations.(57)

Once a target is located, the radar operator can immediately relay its location by digital or voice communications to any element equipped with TACFIRE, battery computer system, or fire direction system.(58) This is significant in that it allows the Firefinders to establish a direct link with MLRS or cannon artillery units. Lastly, the Q-37 radar can be programmed to establish priority areas of coverage on the battlefield. Different zones, which correspond to likely threat artillery locations, can be designated to generate immediate requests for counterfire.(59) In comparison, the Q-4A radar was limited to a range of 15 kilometers, a variable accuracy from 0-200 meters, and voice communications.(60)

The Firefinder radars, however, are not without their vulnerabilities. Both radars are powerful emitters which are susceptible to jamming, directional finding, and ground reconnaissance. In that vein, the emitter should not be allowed to transmit over 2 minutes with 25 seconds being optimum.(61) Additionally, since there are so few Firefinders on the battlefield, it is possible to trace its frequency modulated (FM) communications back to the receiver (i.e. an artillery headquarters).(62) This could result in an immediate counterfire mission on a very valuable asset.

To enhance its own counterfire capabilities, the army has acquired a tremendous weapon in the multiple launch rocket system (MLRS). Although not strictly designed to perform counterfire missions, its ability to deliver large quantities of submunitions over a large area makes it ideally suited for that role. One MLRS launcher, of which there are 9 per battery, can fire 12 rockets in 60 seconds.(63) "The firepower of these rockets is equivalent (in terms of number of submunitions) to 88 rounds of 155-mm dual-purpose improved conventional munitiosn (DPICM)--an eight-gun battery firing 11 volleys."(64) To increase their own survivability from enemy counterfire, MLRS launchers employ shoot and scoot tactics. Upon receiving a fire mission, a launcher will move from its hide position to a firing position, launch its rockets, and scoot back to an alternate hide position. A hot launcher, one that is loaded and waiting, can execute a fire mission in 3 minutes plus travel time.(65)

The ability to fire such a large number of rockets in a short period does pose problems for resupply. Organic to each firing battery are 18 heavy expanded mobility tactical trucks (HEMTT) and 18 heavy expanded mobility ammunition trailers (HEMAT).(66) These lift assets, plus the loaded launchers, allow the battery to fire only nine battery volleys before resupply is

required. This is a problem worth solving given the tremendous capabilities of the weapon system.

Under current doctrine, the normal mission assigned to a divisional MLRS battery is general support.(67) "Fire missions generated or approved by the DIVARTY are passed directly to the MLRS fire direction center for execution."(68) Additionally, the MLRS possesses the technological means to interface directly with the Q-37 radar. However, it must be noted that Field Manual 6-20-1J, Field Artillery Battalion, states very emphatically that:

> ...this link should be used judiciously; that is, only on rare occasions during surge conditions and only for limited periods of time. The use of this link eliminates all TACFIRE-equipped headquarters from the fire support decision process and risks the expenditure of large amounts of ammunition on what may be relatively low-value targets."(69)

It behooves us now to examine TACFIRE's effectiveness to manage the counterfire battle. By reviewing the linkage between the target acquisition battery (TAB) and the firing units, we can gain a clearer picture. The TAB has the mission of locating counterfire targets for the division. Doctrine states that when the TAB's weapons' locating radars (three Q-36's and two Q-37's) are employed properly, they will cover the entire division's front.(70)

Additionally, the idea of radars sharing the requirements to observe a certain area has limited applications under normal conditions.(71) Furthermore, doctrine advocates attaching one Q-36 to each direct support battalion. The zone of its coverage would correspond to the supported brigade's sector. The Q-36 operator locates enemy artillery and transmits requests for fire to the direct support battalion at a rate between two to four targets per minute.(72) Based upon the tactical situation, they will be fired or passed to DIVARTY for execution by general support or reinforcing artillery. A Mitre Corporation study done on the counterfire battle in Europe concluded that this process, the discovery of a target by Firefinder and the subsequent attack of that target, averaged 6 minutes.(73) This appears to exceed the Soviet ideal move time by two minutes.

The Q-37 radars, being primarily long range low-angle assets, normally remain under DIVARTY control. Artillery doctrine focuses these long range assets on the Soviet multiple rocket launchers. "The approximate area on the battlefield in which these targets are expected to be found is designated as a priority zone, especially for the AN/TPQ-37 radar."(74) Targets of this nature generate immediate requests for fire. Other artillery targets acquired

by the Q-37, in its primary and secondary zones, are passed to the target production center in the DIVARTY tactical operations center (TOC). It is here that they are correlated with other elements of intelligence to preclude the wasting of artillery assets on such things as Soviet roving guns. Additionally, targets that meet the commander's attack guidance and exceed the capabilities of the DIVARTY are passed to reinforcing artillery.

SECTION VI

ANALYSIS AND DOCTRINAL IMPLICATIONS

Presently in Europe two opposing alliances with radically different approaches to political and military doctrine are preparing for World War III. One side relies upon mass and firepower while the other tips toward maneuver and technology. Soviet doctrine advocates the high tempo offensive, and its success, to a large degree, is dependent upon firepower. Soviet artillery provides the lion's share of the firepower and is expected, quite literally, to blow a hole through NATO ground forces. The U.S. approach has been to implement AirLand Battle doctrine and develop new weapons systems. More specifically, the U.S. field artillery in the face of Soviet artillery mass elected to acquire the Firefinder radar and the multiple launch rocket system (MLRS). On the surface, these acquisitions appear to be a step in the right direction. However, the question, which still remains unanswered, is whether we are developing the correct doctrine to complement the technological improvements or are we grafting the new acquisitions to the old doctrine?

One thing is certain, the Soviets appear to be cognizant of our recent technological advances, and they are taking steps to analyze their impact. By examining Soviet open source military literature, this evolutionary process can be followed. Recent articles in Voennyy Vestnik (Military Herald) have addressed such issues as firing norms and need for movement. The debate is centered around the merits of reducing the volume of fire and moving frequently to avoid U.S. counterbattery fire. The movement of artillery units, which could occur as soon as four minutes after the initiation of firing, appears to be an option. This would be a radical step in that it would significantly degrade the ability of the artillery to provide support. Additionally, the Soviets are most aware of the capabilities of our Firefinder radars. The powerful emitters will most likely be targeted for destruction or for radio intercept. By tracing the Firefinder's transmissions to the receiver, the Soviets would be able to target our artillery command and control for destruction. Furthermore, in response to our advances, the Soviets have fielded "Big Fred" which enhances their own counterfire capability significantly.

But what of U.S. doctrine and its employment of new weapons' systems? Artillery doctrine does make

allowances for prioritizing its three roles based upon the commander's plans. However, in Europe we must go beyond merely giving priority to the counterfire role. Commanders must mass their artillery to counter Soviet artillery. This step is necessary not purely for the survival of the artillery but for the survival of the force as a whole. Under current doctrine the massing of artillery poses few problems; however, the lack of sufficient numbers of Q-37 radars does pose a problem. Currently, corps artillery has no weapons locating radars. The problem is being rectified, but until then the two Q-37 radars, organic to the division THBs, provide the only long range radar support for the division MLRS battery and the corps field artillery brigades. Since they are so vulnerable and exist in such few numbers, a system of radar sharing should be implemented. Basically, this would envision both radars sharing responsibility for locating targets in the breakthrough zone. The radars would alternate transmissions and reporting. This runs contrary to doctrine which advocates that radar coverage be provided across the entire front of the unit being supported, an approach that is not necessary since we are mainly concerned with suppressing artillery in the breakthrough zone.

An additional problem with the Q-37 radar may center on its area of search, a mission which focuses primarily upon finding Soviet multiple rocket launchers (MRL). This maybe the wrong approach for three reasons. First, their MRLs possess the range to be able to fire from outside our artillery range. Second, their mobility allows them to fire and move before counterbattery fire can be brought to bear. Third and most important, the main threat to our own battle plans appears to come in large part from the RAGs and DAGs. A possible solution might involve the focusing of the Q-37 on the DAGs, but the problem of overlap with the Q-36 radar would exist. This could be solved by an intensive effort by the division target production section.

Lastly, let us focus on the integration of the MLRS and the Firefinder radar. On the whole the marriage appears to be working. But does TACFIRE really exploit the capabilities of the new technology? Research conducted by the Mitre Corporation concluded that an average of 6 minutes elapsed between the time Firefinder located a target and artillery engaged it with fire utilizing TACFIRE. Such data are encouraging; however, we would miss any Soviet artillery which began to move four minutes after initiating fire. As mentioned previously, there are

many reasons for the Soviets not to do this. However, there is not a good reason why this four minute time frame could not serve as a benchmark for U.S. forces. Artillery officers and counterfire officers, in particular, would profit from using this as a standard for peacetime training.

But what if the Soviets could provide effective fire support and move four minutes after initiating fires? The Firefinder and the MLRS do possess the technology to counter those moves. However, the employment of this link is not without its drawbacks. The Firefinder locates <u>single</u> projectiles and as such, the Soviets can deceive us by using roving guns. Firing targets of this nature would result in large and expensive expenditures of ammunition. If the decision were made to employ the direct interface, several doctrinal changes should be made. First, the MLRS battery organic to the division should be attached to the Corps MLRS battalion. This precludes it from being left out of the battle. Second, the DIVARTY TOC should be collocated with the MLRS battalion TOC. This would allow the TAB's target production section to assist in managing the counterfire battle. This is not as radical as it might appear since both the MLRS battalion and DIVARTY are massed in the vicinity of the breakthrough zone.

Third, additional steps need to be taken to improve ammunition resupply of the MLRS battalion regardless of whether the direct link is utilized or not.

In conclusion, I recommend that we begin the next battle with TACFIRE only if we heed certain caveats. First, a commander, preferably the force commander, should position himself so that he can evaluate the effectiveness of the Soviet artillery fires. If, in his opinion, the Soviets are being successful due to their artillery fires, then we must make a decision to employ the direct linkup between the Firefinders and the MLRS battalion. Second, we should not wait until the war starts to practice this new approach. The technology exists now; we need to give it a thorough look before its too late.

ENDNOTES

1. Barry R. Posen, The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars (Ithaca, NY: Cornell University Press, 1984), p. 59.

2. Ibid., p. 55.

3. C.N. Donnelly, "The Development of Soviet Military Doctrine," International Defense Review, (No.12, 1981), p. 1593.

4. Heinz Schulte, "NATO/WP balance: a West German survey," Jane's Defence Weekly, (15 August, 1987), p. 285.

5. C.J. Dick, "Soviet Operational Concepts: Part I," Military Review, (September, 1985), p. 31.

6. Field Manual 100-2-1, The Soviet Army: Operations and Tactics, (Washington: Government Printing Office, 16 July, 1984), p. 5-1.

7. Chris Bellamy, Red God of War: Soviet Artillery and Rocket Forces (London: Brassey's Defence Publishers, 1986), p. 8.

8. Tube equivalent is a generic term; it includes mortars, cannon artillery, and rocket launchers. SS missiles are not included. The figure of 300 tube equivalents was computed by first adding up the number of tubes of each artillery and mortar unit assigned a mission in support of the breakthrough. For example, one BM-21 rocket launcher, consisting of 40 separate tubes, equaled 40 tube equivalents. One SP howitzer counted as one tube equivalent. In a scenario where 75 per cent of the front's artillery is allocated to the breakthrough, I computed a total of 3000 tube equivalents. I then divided that figure by the width of the breakthrough zone, which was 10 kilometers in this case, to arrive at an average for tube equivalents per kilometer.

9. Jonathan M. House, Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, And Organization (Ft. Leavenworth, KS: 1984), p. 27.

10. Ibid., p. 29.

11. Bellamy, op. cit., p. 9.

12. Ibid., p. 10.

13. Ibid., p. 11.

14. Ibid., p. 15.

15. Ibid., pp. 15-16.

16. Ibid., p. 18.

17. Ibid., p. 37.

18. Ibid.

19. Ibid., p. 45.

20. Valdimar Triandafillov, Nature of the Operations of Modern Armies. Translated by William Burhans. (Woodbridge, Virgina: RUSS-ENG Translations, 1929), p. 87.

21. Bellamy, op. cit., p. 47.

22. Ibid., p. 50.

23. Ibid., p. 54.

24. A Front is a Soviet wartime organization that is composed of a combination of tank and combined arms armies. Normally, a Front will contain from three to five armies. It is a rough equivalent of a U.S. army group.

25. G.E. Peredelskii, Marshall of Artillery; A. I. Tokmakov; G. T. Khoroshilov Artilleriia v boiu i operatsii (The artillery in battle and operations) (Moscow: Voenizdat, 1980), p. 5.

26. Ibid., p. 23.

27. Ibid., p. 24.

28. Field Manual 100-2-1, op. cit., p. 5-21.

29. Ibid., p. 5-11.

30. I. Vorobyov, Major General, "Fire, Blow, Manoeuvre," Soviet Military Review, (No. 9, September 1983), p. 16.

31. L. D. Holder, Lieutenant Colonel, "III Corps Maneuver Booklet," (Ft. Hood, Texas: May 1987), p. 16.

32. Ibid., p. 17.

33. Field Manual 100-2-1, op. cit., p. 5-28.

34. C.N. Donnelly, "The Wind of Change in Soviet Artillery," International Defense Review, (No. 6, 1982), p. 740.

35. Field Manual 100-2-1, op. cit., p.8-1.

36. Ibid., p. 9-12.

37. Ibid., p. 9-1.

38. Ibid., p. 9-20.

39. See footnote eight.

40. Field Manual 100-2-1, op. cit., p. 9-20.

41. Peredel'skii, Marshall of Artillery, et.al. op. cit., p. 72.

42. The Army Field Manual, Vol. II: Soviet Doctrine, Part 2, Soviet Operations, (British Manual: 1986), p. 5-8.

43. Field Manual 100-2-1, op. cit., pp. 22-23.

44. Donnelly, "The Wind of Change in Soviet Artillery," p. 739.

45. Ibid., p. 741.

46. The combined arms army is the Warsaw Pact's highest

peacetime formation. It will normally consist of two to four motorized rifle divisions and one or two tank divisions. Additionally, it will be supported by an artillery brigade and a multiple rocket launcher regiment.

47. Field Manual 100-5, Operations, (Washington: Government Printing Office, May 1986), p. 14.

48. Field Manual 6-20, Fire Support in Combined Arms Operations, (Washington: Government Printing Office, December 1984), p. 1-10.

49. Ibid., p. 1-15.

50. Ibid., p. B-5.

51. Ibid.

52. Ibid., p. B-6.

53. Field Manual 6-1, TACFIRE Operations, (Washington: Government Printing Office, May 1986), p. 1-1.

54. The same method of computing tube equivalents was used for U.S. artillery. A generic F.A. brigade consisted of three eight inch battalions, a 155mm battalion, and a Lance battalion. One of the brigades had an MLRS battalion attached. Included in the figure of 636 tube equivalents were the maneuver brigade's mortars and 6 equivalents per Lance battalion.

55. Field Manual 6-161 C1 , Field Artillery Radar Systems, (Washington: Government Printing Office, March 1986), p. 6-1.

56. Ibid., p. 6-8.

57. Field Manual 6-121, Field Artillery Target Acquisition, (Washington: Government Printing Office, December 1984), p. 5-8.

58. Field Manual 6-161, op. cit., p. 6-30.

59. Ibid., p. 6-22.

60. Field Manual 6-121, op. cit., p. 3-6.

61. Field Manual 6-161, op. cit., p. 6-34.

62. Ibid., p. 6-33.

63. Field Circular 6-20-10, Fire Support Targeting, (Ft. Sill, OK: May 1985), p. 1-2.

64. Ibid., p. 3-1. One MLRS rocket contains 644 separate M 77 submunitions each capable of penetrating 2 1/2 to 4 inches of armor.

65. Field Manual 6-20, op. cit., p. B-21.

66. Field Circular 6-60, Multiple Launch Rocket System Operations, (Ft. Sill, OK: Expires December 1987), p. 5-5.

67. Ibid., p. 3-6.

68. Ibid., p. 3-9.

69. Field Manual 6-20-1J, Field Artillery Battalion, (Washington: Government Printing Office, June 1984), p. 2-7.

70. Field Manual 6-161, op. cit., p. 6-11.

71. Ibid., p. 6-35.

72. Phone Conversation with Target Acquisition Department, U.S. Army Field Artillery School, Ft. Sill, OK.

73. N. Niedenfuhr, et al. The Mitre Corporation #MTR -79W 0029 6 Counterfire Campaign Analysis. Volume I. Main Report (U). (McLean, VA: MITRE Corporation, September 1979), p. xxxiii.

74. Field Manual 6-121, op.cit., p. 4-3.

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